

Canadian Wildlife Service,

CLUTCH SIZE - HATCHING SUCCESS

CRANE CHICKS, WOOD BUFFALO

Canadian Wildlife Service.

ATIONAL PARK, CANADA

Canadian Wildlife Series

CRAUCH SIZE, HATCHING SUCCESS, AND SURVIVAL OF MUDPIPERS
CRANE CHICKS, NOOD, BULLFRO, TAILWATER PARK, CANADA

CLUTCH SIZE, HATCHING SUCCESS, AND SURVIVAL OF WHOOPING CRANE CHICKS, WOOD BUFFALO NATIONAL PARK, CANADA

ERNIE KUYT, Canadian Wildlife Service, Department of Environment, 9942 - 108 Street, Edmonton, Alberta, Canada T5K 2J5

Compliments
of author
E. Kuyt

Abstract: Over 90% of whooping crane (*Grus americana*) egg clutches, where eggs could be counted (1966-1980), contained 2 eggs. Some clutches could not be observed because they remained covered by the incubating bird. Predation on whooping crane eggs is minimal and hatching success of eggs left in nests during years when eggs were collected has varied from 65 to 94%, averaging 79%. In most years, mortality of chicks occurs chiefly before 20 June and chicks still alive by the end of July have a good chance of reaching the winter range at Aransas National Wildlife Refuge (ANWR) in Texas. During the last 3 years chick survival has been below the average of 7 birds, which occurred in years when eggs were collected, and chick mortality has increased during late summer. Water levels in the breeding area have declined steadily since 1977 and a relationship may exist between lower water levels, predation, and a decline in production of young cranes.

The struggle for survival by the endangered whooping crane (*Grus americana*) continues to attract public interest. The population nesting in Wood Buffalo National Park (WBNP), Canada, reached 42 birds in 1964 and had climbed slowly but steadily to almost double that number by 1980. During a comparable period of 17 years (1947-1963) the population gain was only 2 birds (Manager ANWR, pers. comm.). This paper summarizes information gathered on the whooping crane breeding range during actual egg collection and during aerial surveys over the area from 1966-1980.

METHODS

Methods employed in the collection of whooping crane eggs during regular surveys have been described elsewhere (Kuyt 1968, 1976a, 1976b). Timing of the first flight depends on the progress of snowmelt in the nesting area but is generally during the last week in April. About 10 or 12 breeding pair surveys may be required to locate all nests and to document laying dates. A further 12-15 flights are made throughout the summer and early fall to monitor survival of chicks and to record other information. Data remain incomplete for 1966 and for some of the years during which eggs were not collected. During these years there was little need to disturb incubating birds and few survey flights were made.

NEST STUDIES

Distribution

Novakowski (1966) indicated a maximum breeding population of 6 pairs in the Sass River area. He stated that 3 to 6 pairs nested elsewhere and that 2 of these pairs nested sporadically in the Klewi River area. He also found that 52% of the 61 young which returned to ANWR from 1954-1965 were produced by the 6 breeding pairs in the Sass River area. Clearly, the Klewi River area must have been of almost equal prominence as a producing area or there must have been (as Novakowski [1966] suggested) other nesting areas. My findings from 1967-1980 (Table 1) appear to corroborate that the Sass and Klewi areas are of equal importance as young-producing areas.

Although difficult to quantify, water levels during dry years seem to remain suitable for a longer period in the Klewi River area than elsewhere and in dry years the Klewi area is the better producing area. Water levels in the breeding range have decreased since 1977 (Kuyt and Johnson, unpublished data), and from 1978-1980 the breeding population in the Klewi area was greater than that in the Sass River.

After the 1st time a pair of breeding whooping cranes was found in the Alberta portion of WBNP (Kuyt 1978), a new nest site was discovered in 1980 between the Sass and Klewi Rivers. Only nonbreeding birds had been found there before (Kuyt 1979, 1981).

CLUTCH SIZE

Novakowski (1966) reported 37 clutches of whooping crane eggs in the Sass River area from 1954-1965. Only a single clutch contained 1 egg (2.7%); all others had 2 eggs (97.3%). Among 203 clutches observed between 1966 and 1980, 184 (90.6%) contained 2 eggs, 16 (7.9%) only 1 egg, and 3 (1.5%) 3 eggs. It is not known why, since 1966, the frequency of single egg clutches has increased among whooping cranes.

Novakowski used a helicopter which always causes the incubating bird to rise and is probably why he determined contents of each nest in contrast to my studies, which failed to determine clutch size in 8 nests during 1966-1972 (Table 1). I used fixed-wing aircraft during my aerial surveys over the nesting range (Kuyt 1968). Miller (1973), summarizing the findings of several other workers studying sandhill cranes (*Grus canadensis*), determined that 304 of 334 clutches (91.0%) contained 2 eggs, 28 clutches (8.4%) had 1 egg, and 2 nests (0.6%) had 3 eggs.

Egg Loss and Renesting

Loss of eggs from whooping crane nests occurs rarely. A nest and 1 egg found on 11 May 1973 was abandoned and the egg disappeared 3 days later. In 1975 and again in 1979, a nest with 2 eggs was found destroyed at the time of the egg pickup, an estimated 10-15 days before hatching.

In 1978 a late nest with 1 egg was found on 16 May on a small pond. A similarly late nest in 1979 had 2 eggs on or about 23 May. The 1978 nest was found empty and deserted on 19 May. The egg left in the 1979 nest after our egg pickup was apparently taken by a black bear (*Ursus americanus*) about 12 days before hatching. Both these nests were thought to be located in unsuitably small ponds surrounded by extensive tracts of forest.

In 1977 a rare clutch of 3 eggs was discovered destroyed 4 days after having been found. The eggs appeared to have been destroyed by large birds, perhaps by the parents.

In 1980 we found 2 nests with 2 eggs each, attended by banded 3-year-old birds. Both nests, first efforts

Table 1. Clutch size of whooping cranes, Wood Buffalo National Park, 1966-1980.

Year	Sass River				Klewi River				Nyarl River			Little Buffalo River		Nonbreeder area		Total
	2	1	3	?	2	1	3	?	2	1	?	2	2	2	2	
1966	4			1					Not surveyed							5
1967	6					2	1		Not surveyed							9
1968	6					4			Not surveyed							10
1969	4	1				6	1		Not surveyed							12
1970	5	1				7				1		1				15
1971	6	1				4	1			1						13
1972	6			2		3	1		3	1						16
1973	6	1				5	1			1						14
1974	8					5	1			1						15
1975	6	2				6		1		1						16
1976	8					7				1						16
1977	7		1			6			2			1				17
1978	4	1				7			1	1		1				15
1979	6		1			9			2			1				19
1980	6	1				9	1		1				1			19
Total	88	8	2	3	80	7	1	4	12	1	1	3		1		211

Summary of clutch size (%)

2 eggs	87.1	86.9	85.7
1 egg	7.9	7.6	7.1
3 eggs	1.9	1.1	0.0
?	2.9	4.3	7.1

Total known clutch size (%)

2 eggs	90.6
1 egg	7.9
3 eggs	1.5

by young birds, were unsuccessful. Nest 19-80 was found empty on 29 May, the day of the egg pickup. A trail of a large mammal, presumably that of a black bear leading from the shore to the nest island, was visible from the air. Nest 18-80, also found abandoned on the day of egg pickup, contained a large part of an egg. Parts of the eggshell and the contents had been eaten. The eggshell contained no punctures and the jagged edges of the shell indicated that a mammal had eaten the egg.

The loss of a clutch of eggs (partial or complete) and subsequent renesting is only rarely documented in northern birds. On 29 April 1976, nest 8-76 was found in the Klewi River area with 1 egg. On 1 May the nest still contained 1 egg. Parts of a broken egg were observed on the nest 3 days later and the parents had abandoned the nest. A pair of cranes at a nest containing 1 egg was observed 1 km northeast of nest 8-76. That new location was only 150 m northeast of the site where a pair (undoubtedly the same pair) had a nest with 3 eggs in 1975. Nest 8A-76 (the renesting) had 2 eggs by 6 May, but neither egg hatched. Nests 8-76, 8A-76, and 10-75 were all located within the same Composite Nesting Area Klewi 7 (Kuyt 1981) and were probably produced by the same pair of cranes.

In 1980, nest 14-80 in the Klewi River area had 1 egg on 7 May, 2 eggs on 9 May, but was found abandoned and empty on 14 May. On 3 June, nest 14A-80 was found

with 2 eggs 700 m southeast of abandoned nest 14-80 and 300 m from last year's nest 15-79. Nests 15-79, 14-80, and 14A-80 are all within the same Composite Nesting Area Klewi 3. On 3 July, nest 14A-80 was still attended by an adult bird. On 10 July hatching was at least 1 week overdue and broken shells were in the nest. The adults had abandoned the nest.

The above 2 examples are the only incidences of what I believe to be renesting by whoopers who had lost their initial clutch.

Hatching Success

During years in which eggs were not collected (1966, 1970, 1972, and 1973) there was no great need to determine exact laying dates and clutch size. During the field season of 1970, 1972, and 1973 the writer spent considerable time on waterfowl surveys along the coast of Beaufort Sea, and exact numbers of eggs laid and hatched remained unknown. The numbers shown in Table 2, therefore, are minimum values, particularly during the above mentioned years.

Data for years during which eggs were collected (and for these years more complete data are available) show that between 131 and 141 eggs hatched in WBNP. The difference between number of eggs laid and collected during these years is 172 eggs, giving a hatching success of between 76 and 82%.

In most years, mortality of chicks occurs during the young birds' first 2 weeks of life and juveniles still alive by the end of July have an excellent chance of reaching the winter range (Table 3).

From 1978-1980, however, chick losses appeared to occur throughout summer rather than being concentrated between hatching and 20 June. I mentioned earlier that water levels in the breeding range have declined since 1977. Production of young during the past 3 years has been below the average for "pickup" years (Table 3). The most plausible explanation for the change in mortality of chicks during the last 3 years is the gradual drying of the feeding terrain of parent cranes and their flightless chicks. Young whoopers and their parents almost always feed in shallow ponds and along margins of deeper ponds. When feeding areas dry up, whooper families are forced to travel farther in order to find suitable water bodies. In so doing, they expose themselves to terrestrial predators that find the marshy areas more accessible than before.

Young whoopers do not fly until 80-90 days old (R. Drewien, pers. comm.) and are vulnerable until about the 3rd week of August. In 1979 a wolf (*Canis lupus*) killed and ate a large juvenile whooping crane on 13 August (Kuyt and Johnson, unpublished data); 6 other young banded on that day, varied from 3.75 to 4.75 kg. One of the 6 young (from the nesting territory bordering the area where the young was killed) failed to arrive at ANWR and possibly was also killed by wolves.

LITERATURE CITED

KUYT, E. 1968. Collection of whooping crane egg from Wood Buffalo National Park. *Trans. Federal Provincial Wildl. Conf.* 32:30-35.

—. 1976a. The continuing story of the whooping crane. *Proc. Symposium on Canada's threatened species and habitats.* Ottawa. 20-24 May 1976.

—. 1976b. Whooping cranes: the long road back. *Nature Canada* 5:2-9.

—. 1978. A modern nesting record for whooping cranes in Alberta. *Blue Jay* 36:147-148.

—. 1979. Banding of juvenile whooping cranes and discovery of the summer habitat used by non-breeders. Pages 109-111 in J. C. Lewis, ed. *Proceedings 1978 Crane Workshop, Colorado State Univ. Printing Service, Fort Collins.*

—. 1981. Population status, nest site fidelity, and breeding habitat of whooping cranes. (In this publication).

MILLER, R. S. 1973. The brood size of cranes. *Wilson Bull.* 85:436-441.

NOVAKOWSKI, N. S. 1966. Whooping crane population dynamics on the nesting grounds, Wood Buffalo National Park, Northwest Territories. *Canadian Wildl. Serv. Rep. Ser.* 1, 20 pp.

Table 2. Hatching success of whooping cranes in the wild, Wood Buffalo National Park, 1966-80.

Year	No. of nests	No. of eggs laid	No. of eggs collected	No. of eggs hatched in Canada	Minimum % hatching success ^a
1966	5 ^b	9-10	0	5-10	56
1967	9 ^b	17	6	10-11	91
1968	10	20	10	8-9	80
1969	12	22	10	10-11	83
1970	15	27-29	0	6-30	22
1971	13	24	11	10-11	77
1972	16	26-31	0	6-32	23
1973	14	26	0	5-25	19
1974	15	29	13	15-16	94
1975	16	31	14	11	65
1976	16	32 ^c	16	14	88
1977	17	35	16	14-15	74
1978	15	28	13	10-13	67
1979	19	39	19	14	70
1980	19	36 ^d	13	15-16	75

^a Least possible number of eggs hatched

$$\frac{\text{Least possible number of eggs laid} - \text{eggs collected}}{\text{Least possible number of eggs laid}} \times 100\%$$

^bData probably incomplete.

^cNot including 1 egg in nest 8-76. Egg disappeared, birds renested (2 eggs) at 8A-76.

^dNot including 2 eggs in nest 14-80. Eggs disappeared, birds renested (2 eggs) at 14A-80.

Table 3. Survival of whooping crane chicks, Wood Buffalo National Park, Canada, 1966-1980^a.

Year	No. of nests	No. of eggs hatched	Minimum no. of chicks surviving			No. of chicks arriving at Aransas ^b
			20 Jun	29 Jul	3 Sep	
1966	5 ^c	5 ^d		Data incomplete		5
1967	9 ^c	9 ^d		Data incomplete		9
1968	10	10	8	6	6	6
1969	12	12	10	?	8	8
1970	15	6-11 ^c	?	?	6	6
1971	13	10	8	6	6	5
1972	16	6-16 ^c	6	5	5	5
1973	14	5-11 ^c	5	3	2	2
1974	15	15 ^d	4	4	2	2
1975	16	11	9	8	8	8
1976	16	14	13	12	12	12
1977	17	14-15	10	10	10	10
1978	15	10-13	10	8	6	6
1979	19	14	13	9	7	6
1980	19	15-16	13-14	6	5	6?

^aAverage for 11 pickup years (1967-1969, 1971, 1974-1980): 7 chicks/year. Average for 4 other years (1966, 1970, 1972-1973): 4.5 chicks/year.

^bData from Refuge Manager, ANWR.

^cData probably incomplete (particularly in years when no eggs collected).

^dIncluding 1 set of 2 siblings.

DATE DUE SLIP

IN RECEIVED NOV 14 '95

RETURN NOV 29 '95

IN RECEIVED MAR 08 '96

MAR 31 RETURN
RETURN APR 10 '96

IN RECEIVED RETURN AUG 26 '96

IN RECEIVED RETURN OCT 04 '96

F255

46590

BOREAL INSTITUTE FOR NORTHERN STUDIES, LIBRARY
THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA T6G 2E9
CANADA

University of Alberta Library



0 1620 0334 0724